



---

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

# Building Appropriate Institutions to Support the Use of Earth Observations from Human Security

Agnieszka Lukaszczyk

&

Ray Williamson

*Promoting Cooperative Solutions for Space Security*



# Mission Statement

---

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

The Secure World Foundation (SWF)  
is a private operating foundation  
dedicated to the secure  
and sustainable  
use of space  
for the benefit of Earth  
and all its peoples

*Promoting Cooperative Solutions for Space Security*



# What Does the Foundation do?

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

- **Engages** with academics, policy makers, scientists and advocates in the space and international affairs communities to support steps that strengthen global space security.
- **Promotes** the development of cooperative and effective uses of space for the protection of the Earth's environment and human security.
- **Acts** as a research body, convener and facilitator to advocate for key space security and other space related topics and to examine their influence on governance and international development.



# Key Governance Focus Areas

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

- **Space Sustainability**
  - Protection of continued utility of space resources
- **Human security**
  - Development and disaster assistance
  - Environmental and climate change
  - Countering degradation of land, air, water, and ice
- **Planetary threats**
  - Mitigating the threat of collision from a Near-Earth Object (NEO) through the establishment of effective governance for response



---

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

# Death, Damage, and Destruction

*Promoting Cooperative Solutions for Space Security*



# Phuket, Thailand

Credit: [www.washingtonpost.com](http://www.washingtonpost.com)



# Banda Aceh, June 23, 2004

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)



# Banda Aceh, December 28, 2004

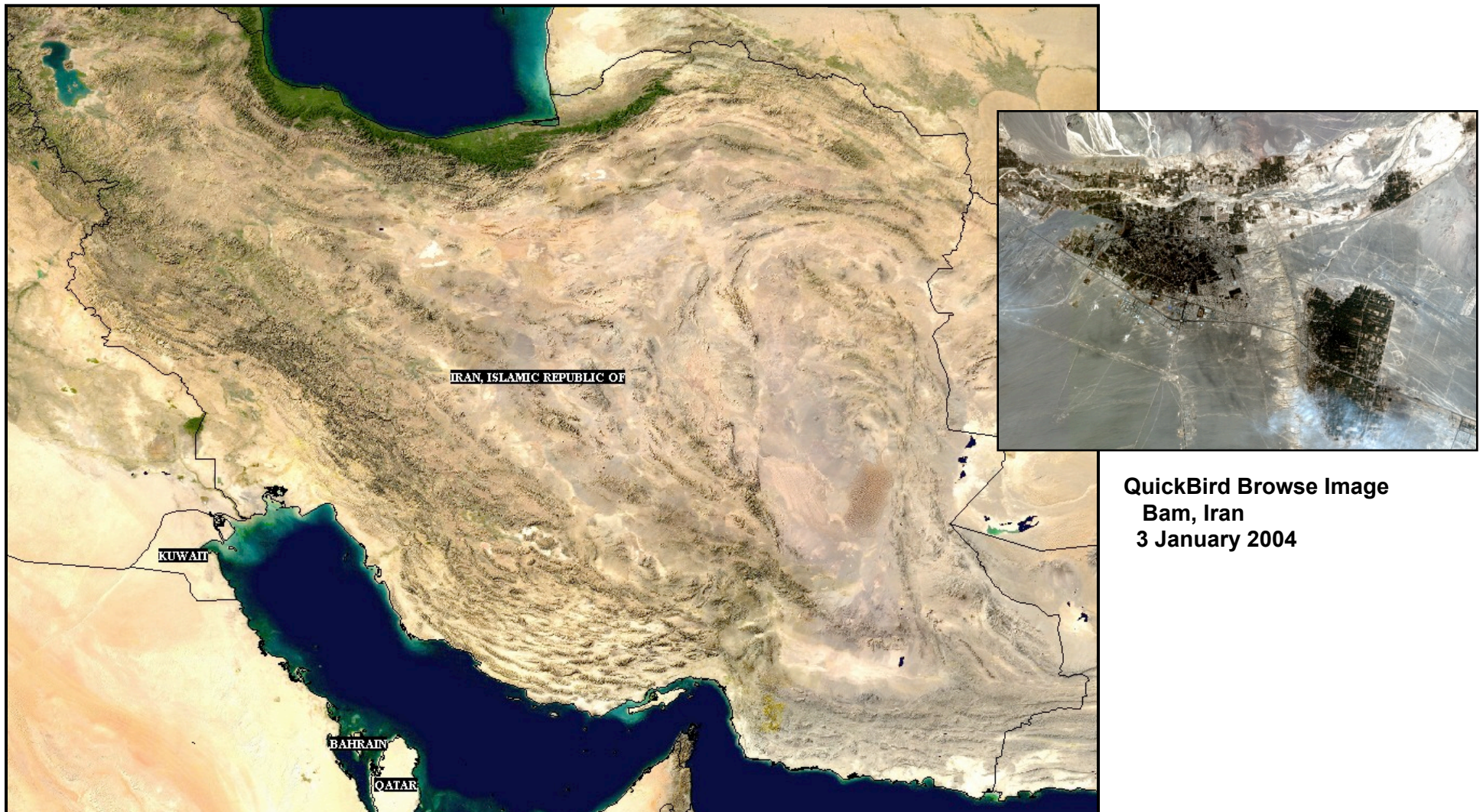
[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)





# Earthquake, Bam, Iran

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)



**QuickBird Browse Image  
Bam, Iran  
3 January 2004**

# Earthquake, Bam, Iran

Credit: DigitalGlobe & Imagecat

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)



# Earthquake, Bam, Iran

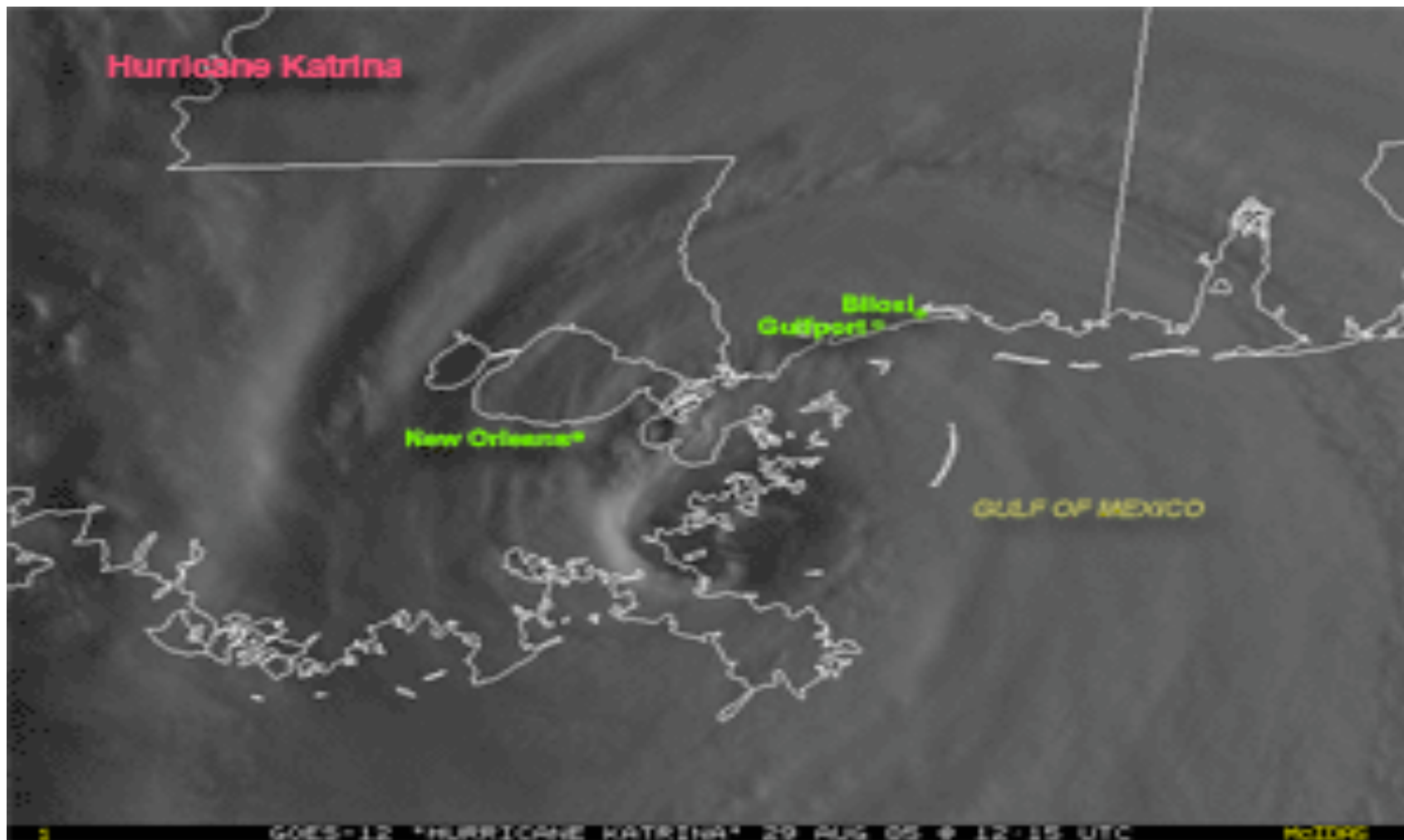
Credit: DigitalGlobe & Imagecat

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

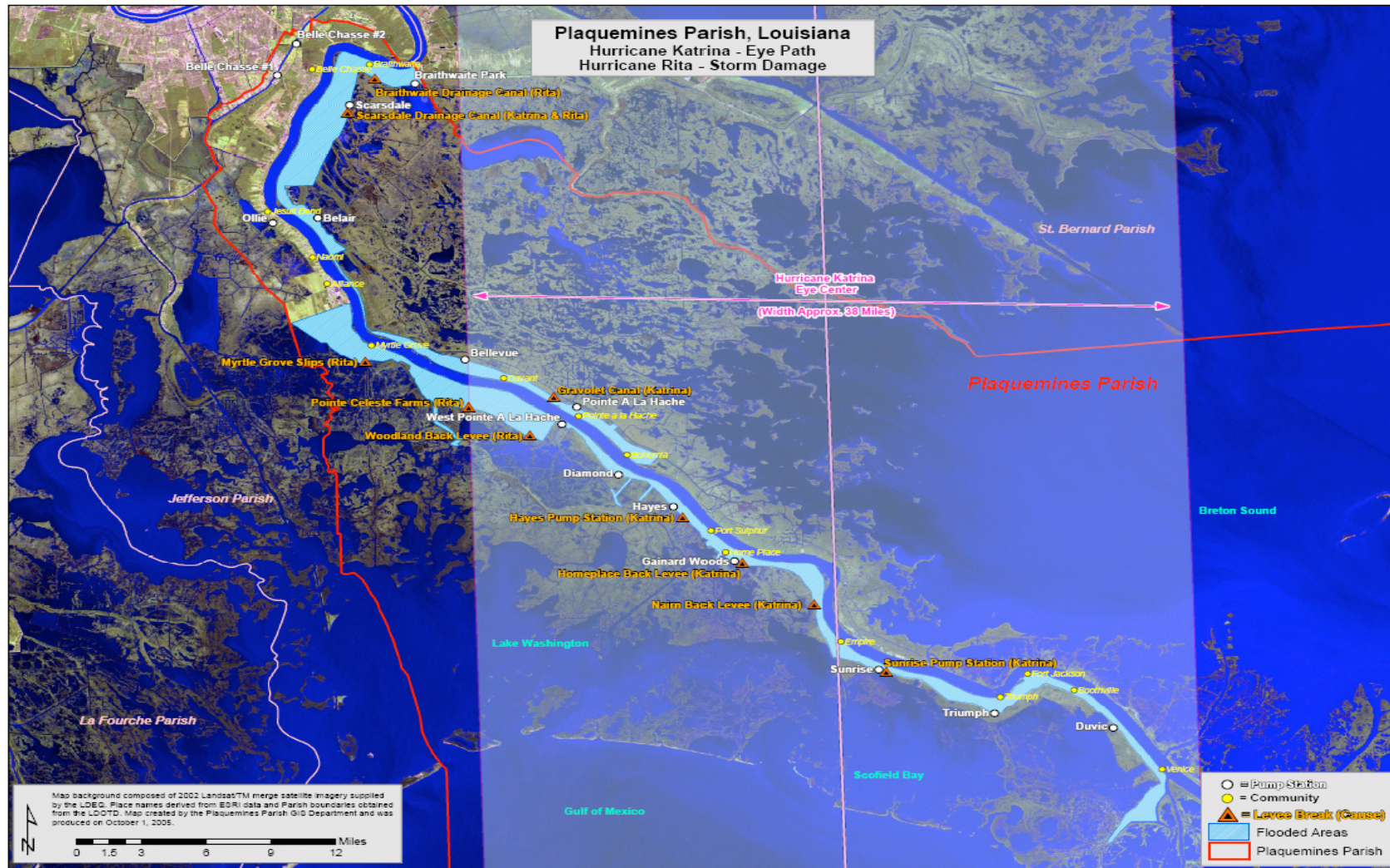


# Hurricane Katrina

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)



# Hurricane Katrina





# Hurricane Katrina





# Remote Sensing for Disaster Response

---

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

Where are we now and have we  
learned our lessons?



# Technological Progress

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

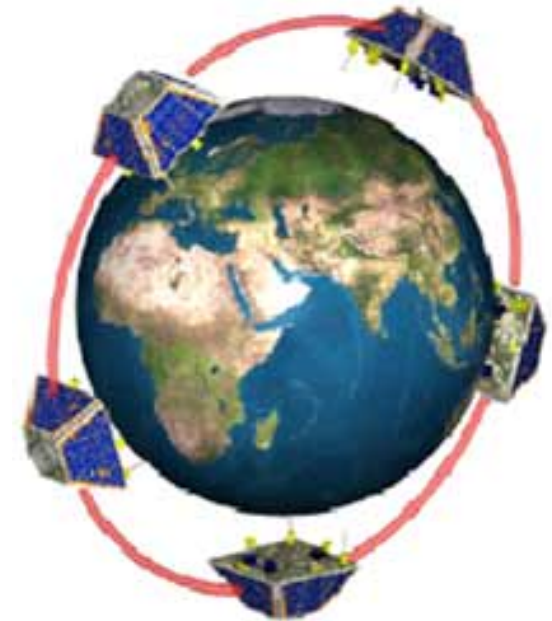
- Vastly improved access to data
  - Faster delivery to data analyst after collection
  - More data sources in the works (aerial/satellite)
    - Electro-optical
      - Variety of resolutions
      - Single satellites, constellations
    - Synthetic aperture radar (SAR)
      - Radarsat II (Canada)
      - TerraSar (Germany)
    - Aerial lidar
- Many, more powerful, analytical tools
  - Rapid, automatic change detection
- Related tools, such as PNT, GIS more powerful than ever
- And more RS technology on the way.



# International Institutional Progress

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

- International Charter; Space and Major Disasters
  - Successes in providing data rapidly to distressed countries
    - What happens on the ground in the affected area?
- Disaster Monitoring Constellation
  - Five 32 m resolution satellites in constellation
  - Leading the way forward for developing countries to gain access to RS data, capabilities
    - How are these data used?



SSTL



# Global Monitoring for Environment and Security – GMES

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

- Joint initiative of EC and ESA to establish a European capacity for space-based operational information
- Develop Europe's capability to supply independent and permanent access to reliable and timely information on the status of Earth's environment at all scales, from global, regional and local, in support of policy and sustainable development

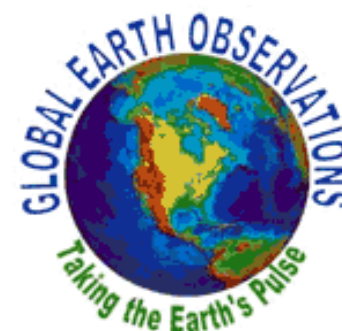




# Global Earth Observation System of Systems – GEOSS

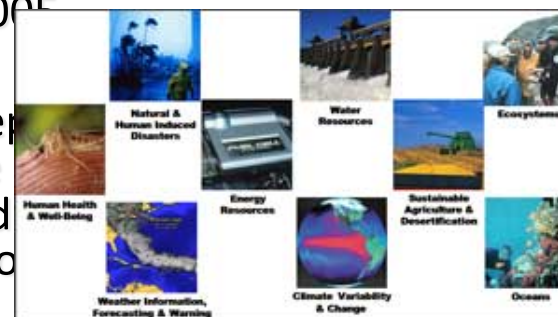
[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

- Created in July 2003, GEOSS is designed to help all nations involved produce and manage their geospatial information to benefit the environment as well as humanity by taking a pulse of the planet.
  - Builds on and add value to existing EO systems by coordinating their efforts, addressing critical gaps, supporting interoperability, sharing information, reaching a common understanding of user requirements, and improving delivery of information to users



- Participants created an ad hoc intergovernmental Group on Earth Observations (ad hoc GEO) to develop a 10-Year Implementation Plan, agreed to on February 16, 2005

- The success of GEO for response to disasters will depend heavily on the ability of the GEO Secretariat and the member nations to organize and produce data and information in forms that are appropriate to these applications





---

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

# Yet, Many Challenges Remain: Primarily Institutional

*Promoting Cooperative Solutions for Space Security*



# Hurricanes Katrina & Rita

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

- Looking on the bright side
  - Lots of data available
    - Satellite
    - Aerial
    - TV coverage
  - Possible for some families to see their property on the internet fairly soon after the hurricane passed
  - Research on effects of hurricane by Imagecat and other research institutions



# But...

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

- Uncoordinated use of data collected
  - Does the information reach first responders in the local community?
  - Can the user make use of the information available?
    - Loss of communications
    - Lack of electricity
    - Lack of experience & training
  - Lack of coordination
- Lack of understanding of the needs of the user
- Lack of data format standards
- Slow turn around from data to useful information



## Observations of Response/Recovery Involving Remote Sensing and GIS Services

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

- “Clear communication...
- Discrete role definition, responsibility, and authority...
- Clear and consistent requirements and specifications...
- Clear purpose and understanding of end-user needs...

**...DO NOT EXIST!”**

Anne Hale Miglarese, President, EarthData International



# Plaquemines Parish Summary of Experience

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

- Despite numerous written and verbal requests by multiple Parish contacts, a uniform, useful and complete imagery coverage of the Parish was difficult to obtain.
- Much of the data that has been provided has been delivered in formats that are not conducive to quick and easy integration into existing GIS structure.
- Agencies have been unable to deliver post Katrina coverage of all damaged areas (entire Parish) even before Rita's effects were felt.

Andrew MacInnes, Plaquemines Parish





## Continued...

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

- Agencies have delivered other images (video and scattered still obliques) but these have little value for GIS analysis.
- The importance of receiving complete post-Katrina imagery is of extreme importance, especially in regard to assessment of damaged properties and infrastructure due to a particular storm.
- High turnover rate of FEMA, National Guard etc. support means multiple requests must be made to get the message through.



# Conclusions

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

- Today, more and better data available more quickly
- Lots of important, enlightening research
  - Improved change detection
  - Growing digital archive of building inventory
- Some communities are making effective use of the data
- Need more effective path from research to applications
  - How to move private sector methodologies into government use by first responders?
- Need training for first responders



# Challenges Ahead

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

- EO still not sufficiently well coordinated
- Geospatial data valuable for ....
  - Build the business case for better information, faster
- Clarify roles of different participants
  - International agencies
  - Government agencies
  - Private sector
- What about preplanning?
  - Some disasters are really surprises, many are not
  - Need data delivery systems in place
  - Need to work with government agencies ahead of time



# Future Opportunities for the R&D Community

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

- Continue to do first-rate research
- Help to educate potential users about the value of the data and analysis you do
  - Not enough to publish in books & scholarly journals—important to reach out to a broader public
- Help to educate policymakers about the value of Earth observations for recovering quickly and rebuilding effectively
- Extend applications to developing world



# Useful Websites

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

- American Society for Photogrammetry and Remote Sensing: <http://www.asprs.org>
  - ASPRS 10-year market forecast
  - ASPRS database of land remote sensing satellites (Bill Stoney's compendium)
- NOAA-sponsored Commercial Remote Sensing Symposium:  
<http://www.crssymposium.com/program/index.aspx>



---

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)

Thank You for your  
Attention!

*Promoting Cooperative Solutions for Space Security*